

# Managing Petroleum Waste Prahova County



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**Project Title:** Establishing a Model Program for Recycling and Reusing Petroleum Waste in Prahova County, Romania

**Leader:** Prahova County Council (Ploiesti, Romania)

**Partner:** CEVA International, Inc. (New Jersey, USA)

**Location:** Ploiesti, Romania

**Project Duration:** January 2000 – May 2001

**EcoLinks Project Investment:** EcoLinks Grant Support: \$50,000; Project Team Cost Share Contribution: \$27,763

## Best Practice: Transferable Solutions

This project, “Managing Petroleum Waste in Romania,” is an EcoLinks Best Practice. It demonstrates a successful model for collecting and processing petroleum waste in Prahova County, Romania providing an empirical knowledge base for implementing a comprehensive used oil management system throughout Romania. By recycling used oil, 1) environmental impacts from used oil contamination of land and water resources are significantly reduced, and 2) savings are generated from averting costly clean-up measures and turning used oil waste into an energy resource. In addition to developing an environmentally sound and economically beneficial used oil management scheme, this Best Practice establishes a local and national regulatory framework for used oil collection and recycling throughout Romania.

# Project Summary

This section provides a brief overview of the project including the problem it addresses, its purpose, methods (i.e., activities), and benefits.

Before 1989, Romania had a centralized system for managing petroleum waste. Up to 90,000 tons of used petroleum were collected and recycled annually from the industrial sector and individual generators (i.e., operators of motor vehicles, utility engines, and farm equipment). This system broke down after the fall of communism as Romania embraced a free market system. In 1998, less than 2,000 tons of used oil waste were collected in Romania. The County of Prahova in Romania suffered this decline in used oil collection and recycling along with the rest of Romania. While Prahova County generates approximately 1000 tons of used oil waste per year now, only 100 tons are collected and recycled.

A new system for collecting and recycling used oil is needed in Romania to avoid human and environmental health risks from contaminated land and water resources, and to reduce costs associated with used oil waste clean-up efforts and the consumption of non-renewable energy resources. Without a management system in place, hundreds of tons of used oil containing heavy metals and polyaromatic hydrocarbons are 1) poured into Prahova's municipal sewers; 2) directly discharged on land or in surface water; 3) used inappropriately for dust suppression or wood impregnation; or 4) burned as low-grade fuel. Recycling used oil promotes the efficient use of valuable non-renewable resources and avoids costly and detrimental alternatives for disposing of used oil.

This EcoLinks project addresses the challenge of taking the first steps toward developing and implementing a new program for managing petroleum waste in Romania. The Prahova County Council in Romania in collaboration with CEVA International, Inc., an American based firm, designed and implemented a model system for collecting and recycling petroleum waste in Prahova County that can be implemented throughout Romania. It emphasizes 1) the use of up-to-date monitoring, collection and storage equipment and innovative recycling efforts; 2) securing the necessary legal framework and volunteer support of oil waste collectors and generators; and 3) collaborative public and private partnerships.

This project consisted of the following key implementation activities: (Note: A detailed outline of the project activities is provided in the section titled, "Project Activities.")

- 1) A collection scheme for used petroleum was developed and tested with an emphasis on promoting recycling.
- 2) A regulatory framework for managing used oil waste was implemented at the local and national scale.
- 3) Public-private partnerships were developed to initiate and commence operation of a local collection and recycling scheme.

- 4) An awareness raising campaign targeting businesses and the public was designed and implemented to draw attention to the environmental and economic benefits of collecting and recycling used petroleum.

This project provides several capacity building, environmental, and economic benefits. (Note: For a detailed description of the project benefits, see section titled “Project Benefits.”)

- Expanded institutional capacity to manage petroleum waste in Romania.
- Reduced used oil contamination of land and water resources and decreased demand for non-renewable, virgin fuels.
- Enhanced economic efficiency by generating energy from recycled used oil waste and reducing environmental clean up costs associated with used oil contamination of soil and water.

This section is a summary of the overall project. For a detailed outline of the project activities, project benefits, lessons learned, and contact information, proceed to the following sections or click on the specific section of interest through the main page.

## **Project Activities**

This best practice is based on carrying out several activities. These activities, listed below, were conducted as a pilot project in Prahova County, Romania. They provide a “how-to” basis for implementing a used oil management scheme throughout Romania and Eastern and Central Europe where applicable.

### **1. Generated alternatives for managing petroleum waste**

Action: A comprehensive study of alternative schemes for managing used petroleum with a significant bibliography was developed by INCERP, subsidiary of the National Oil Company SNP Petrom, and “Petroleum-Gas” University of Ploiesti in Romania and distributed amongst project members. The results of the study were presented to project team members in a workshop format.

Product(s): 1) Fifteen distributed copies of a 150-page study on used oil management schemes based on a comprehensive bibliography of 100-reference citations 2) A thirteen-page Executive Summary in English 3) Two-day workshop (ten hours of presentations and four hours of discussion) for knowledge transfer among project team leaders.

### **2. Developed, adopted, and enforced county and municipal rules for appropriately handling used petroleum**

Action: Council County Decision 22/2000 for managing used oil was adopted and promoted in Prahova County, and the Ploiesti Environmental Protection Inspectorate (EPI) developed draft norms and guidelines to implement the County Decision. This draft was reviewed by a Technical Committee formed by the Prahova County Council, Prahova Prefecture, Mayors Office of the City of Ploiesti, SNP “PETROM”

SA (Subsidiaries INCERP CERCETARE Ploiesti and PECO Prahova), and “Petroleum-Gas” University of Ploiesti.

Product(s): 1) Prahova County Decision 22/2000 finalized and distributed to 135 used oil generators and 16 media channels (local newspapers, radio, and television)  
2) Public meeting involving over 90 participants .

### **3. Reactivated former collection scheme**

Action: An intermediary collector used oil, PECO, was identified. PECO then “re-activated” formerly operating transfer and storage facilities by ensuring the following equipment measures: 1) transfer deck for barrels, equipped with a below-grade basin where used oil is temporarily stored before being transferred to storage tanks; 2) discharge opening with a gear pump enabling the direct transfer of oil waste from road tankers; 3) two horizontal, above-ground, intermediary, storage tanks; and 4) pipelines and valves for controlled oil waste pumping. A transfer protocol including record keeping and labeling guidelines was established.

Product(s): 1) Updated transfer and storage facilities 2) Transfer protocol documentation 3) Special form for documenting each transfer and transfer procedure 4) Labeled containers disseminated to PECO gas stations for collecting used oil from citizens.

### **4. Assessed collected used petroleum**

Action: A sampling protocol was developed for keeping track of the quantity and quality of collected, used oil. As part of the protocol, two samples are taken from each batch of used oil (from barrels or road tanker) and labeled with an ID number corresponding to the transfer documentation. One sample is analyzed and the other sample is sealed and kept at the depot until the respective batch is disposed. The oil is transferred to storage tanks, which are also monitored periodically.

The used oil samples are tested for the following: density, water content, sediment, and diluents, oxide ash and sulfur content, total chlorine/halogen content, and metals (e.g., cadmium, chromium, nickel, copper, vanadium, zinc, and lead).

Product(s): 1) Technical report of analytical results from 18 samples of collected used oil representing the average of multiple collection sample results 2) Database of results of quantitative survey of used petroleum generation.

### **5. Promoted public-private partnerships**

Action: To initiate the program and implement collection strategies, public-private partnerships were established. The roles and activities of each actor were defined. Each identified actor was provided with rules and instructions for handling petroleum waste. EPI staff and the Council project manager conducted on-site visits with generators and primary collectors. Information gathered during the site visits was integrated into a database.

Product(s): 1) Scheme operators identified including: 103 used oil generators and primary collectors, one intermediary collection facility, one recycling/refining facility, analytical and technical supervisors, and regulatory body 2) Information on generators contributing to database compilation.

## **6. Supported participation of small businesses**

Action: Many of the generators of used oil include small businesses such as individually owned gas stations and some car service and repair shops. Their participation in a collection scheme is critical, yet they usually have fewer resources to engage in a collection scheme. A road tanker equipped with a pumping/aspiration device was donated by CONPET Prahova (a national company that transports crude oil) at the request of the County Council and the EPI.

Product(s): Donated truck for collection of used oil from small businesses.

## **7. Conducted awareness-raising campaign on the environmental and economic benefits of recycling used oil targeting businesses and the public**

Action: Five eight-hour trainings were conducted for scheme operators to inform and get feedback on the proposed collection scheme. A training manual was developed outlining five sessions covering environmental pollution, international and national regulations, used oil management schemes, disposal pathways, and an introduction to the Prahova County pilot scheme for used oil collection and recycling. Public awareness-raising and education materials were developed, published, and distributed.

Product(s): 1) Training manual 2) 135 slides for slideshow presentation 3) Five one-day trainings 3) Public awareness materials: six two-page fliers, 20-page brochure, two color warning posters, on-going press releases.

## **8. Initiated effort to promote country wide used oil collection and recycling program**

Action: Two technical meetings were organized by the Ministry of Waters and Environmental Protection. International experts from the German Ministry of Environment and the Italian Consortium of Used Oils attended. Based on these meetings, draft national regulations for managing petroleum waste were developed. An experience-sharing workshop was also held and attended by Environmental Protection Inspectorate representatives, County Council representatives from six Romanian counties, and 12 local media representatives.

Product(s): 1) Two technical meetings 3) Draft national regulations for managing used oil 3) Experience-sharing workshop: presentation of project background, project implementation progress and results and facilitated group discussion.

## **9. Prepared brief technical report on Prahova pilot project for collection and recycling of used oil**

Action: The Prahova County Council, CEVA, and project associates collaboratively prepared a report documenting the main findings and results of the pilot project. The report was disseminated to relevant and interested parties.

Product(s): An 80-page report on the methods and results of implementing a pilot scheme for collecting and recycling used oil in Prahova County, Romania.

These are the steps taken by the project leader, partner, and multiple associates to achieve the purpose of the project. In taking these steps, several benefits were generated. They are covered in this next section.

## **Project Benefits**

Several notable benefits were generated as a result of this project. This project demonstrates a successful way 1) to strengthen the capacity to handle petroleum waste in Romania, 2) to reduce environmental impacts from inappropriately handled used oil waste, and 3) and to promote economic efficiency. A detailed description of the project benefits is provided in the following subsections.

### **Capacity Building Benefits**

The capacity to implement a used oil management scheme is key. This project builds implementation capacity by increasing public and private business awareness, promoting compliance and participation, establishing a regulatory framework, and providing an empirical knowledge base.

**Increased awareness of the environmental and economic advantages of controlled collection and recycling of used oil:** A public outreach campaign including trainings, workshops, and educational materials was conducted increasing awareness of the environmental and economic advantages of controlled used oil collection and recycling.

**Increased compliance and participation in collecting and recycling used oil:** At completion time of the project, 103 used oil generators (i.e., primary collectors) were already participating in the pilot-scheme. It is anticipated that with further expansion of the collection scheme, 106 generators will be participating in the program. Through their participation and support, business firms and local government authorities increase their environmental credentials.

**Enhanced local and national institutional capacity for the proper handling of used oil waste:** A regulatory framework for managing used oil was implemented at county and national levels. Prahova Council's Decision 22/2000, initiated by this project, set up the regulatory framework necessary for establishing the pilot collection and recycling program in Prahova County. This framework can be used by other counties in Romania to promote similar programs. A national regulatory framework

was developed, establishing the institutional mechanisms for promoting the collection and recycling of used oil throughout Romania.

This project promoted public-private partnerships. These collaborative relationships allowed Prahova County to achieve its goal of increasing control over the handling of used oil waste, and provided private businesses the opportunity to increase their efficiency. These partnerships are likely to facilitate other activities that mutually address community and commercial interests.

**Strengthened knowledge base for improving and expanding used oil collection and recycling in Prahova County and throughout Romania:**

By running this pilot project, real empirical “hands-on” data was gathered about the challenges and opportunities of implementing a petroleum waste management program in Romania. The project conclusions and results were shared with representatives of County Councils and Environmental Protection Inspectorates from six Romanian counties. The information gathered in this pilot project provided a foundation for: 1) initiating used oil collection and recycling schemes in other counties throughout Romania; 2) further expanding and improving the collection and recycling system in Prahova County; and 2) finalizing national regulations for the management of used oil.

**Environmental Benefits**

This project generates environmental benefits by empirically demonstrating how to reduce 1) used oil contamination of land and water, and 2) pressure on non-renewable fuel resources. It further provides a successful methodology for running cement kilns on used oil and recycling used transformer oil further minimizing waste output and increasing the efficient use of precious resources.

**Reduced used oil contamination of land and water resources:** At completion time of the project, 103 used oil generators were participating in the pilot scheme providing used oil collection points on their premises and ensuring proper handling of the waste. The level of participation in the scheme is expected to reach a total of 160 used oil generators and primary collectors. Higher participation in the scheme means less damage to the environment from mismanaged used oil waste.

Before the collapse of the former collection scheme, approximately 90,000 tons of used oil was collected per year in Romania. After the system broke down, only 1,800 tons of used oil were collected. Table 1. indicates the amount of used oil recoverable through the new scheme.

<b>Activated Collection and Recovery Scheme for Used Oil</b>	<b>Used Transformer Oil</b>	<b>Other Used Oil</b>
<b>Generated Used Oil</b>	6,500 tons per year in Romania	1000 tons per year in Prahova County
<b>Amount Recoverable</b>	5,200 tons per year	500-600 tons per year
<b>Recovery Rate</b>	80%	50-60%

Table 1. Used Oil Recovery with New Scheme.

**Reduced pressure on non-renewable resources:** Under the new scheme used oil is turned into a secondary resource supporting cement kiln operations and other activities. Producing a secondary fuel resource reduces the need for raw fuel resources. By re-refining 5,200 tons of used transformer oil (the recoverable amount per year in Romania), 25,000 tons of selected crude oil is saved per year. Emissions generated from a cement kiln using used oil are the same as one using conventional oil so there is no additional pollution generated from used oil combustion.

**Increased recycling of used transformer oil preventing uncontrolled emissions associated with illegal burning:** Over period of five months, 50 tons of used transformer oil were collected and re-refined by Astra Romana Refinery, Ploiesti in Romania to generate energy to support refinery operations. Before implementing this recycling alternative, used transformer oil was illegally burned. This refinery recently implemented an energy savings program to reduce greenhouse gas emissions by improving energy efficiency and uses the re-refined used transformer oil in an efficient manner.

### **Economic Benefits**

This project promotes several economic benefits. It establishes a demonstrated method for 1) minimizing the reliance on more costly, conventional, virgin fuels; 2) enhancing the economic vitality of small and medium-sized businesses; and 3) significantly reducing remediation costs from mishandled used oil.

**Savings generated from using re-refined transformer fuel:** Used transformer oil is the least contaminated used oil type. It can be easily reprocessed at no additional cost and with minimum environmental impact. The reprocessing of used transformer oil ensures higher-value recycling (as compared to combustion in cement kilns from derived fuel).

Using recycled oil also displaces the demand for virgin oil or conventional fuels that are limited, non-renewable, and costly. The amount of transformer oil generated from used transformer oil in Romania potentially increases production at Astra Romana that is valued at \$1,820,000 (the cost of transformer oil is \$500/ton).

**Savings generated from fueling cement kilns with used oil:** Operating a cement kiln on used oil rather than select crude oil produces a savings of \$63,000-\$75,600 per year.

**Promotion of small and medium-sized businesses:** The implementation of national regulations on the collection and processing of used oil will likely define financial instruments to support scheme operations. This will attract new scheme operators promoting small and medium-sized businesses involved in collecting and recycling used oil.

**Avoided costs associated with remediation efforts to handle mismanaged petroleum waste:** Implementing an effective collection and recycling program for used oil waste prevents environmental damages caused by the mismanagement of petroleum waste. Thus, costs associated with cleaning up soil and water contaminated with used oil, for example, are avoided.



# Lessons Learned

Several lessons were learned during the implementation of this project. These lessons, outlined below, provide useful insight into the additional opportunities and unanticipated challenges of implementing a used oil collection and recycling scheme.

- Workshops and a field survey of petroleum waste generators not only encourage compliance, but also help to identify any informal institutional mechanisms for handling petroleum waste that might hinder controlled collection and recycling efforts. For example, it was discovered through the workshop and on-site visits with generators that there are “underground” collectors of used oil who illegally sell insufficiently treated oil as “light liquid fuel” to be burned in small combustion devices without any emissions control.
- Defining and assigning clear roles and face-to-face communication facilitate project implementation.
- Despite a well-designed and implemented public outreach campaign, ensuring quality control of the collected product is difficult.
- While operator participation is enhanced if non-compliant transfers of petroleum waste (e.g., waste contaminated with water) are accepted, these transfers create used oil processing problems at collection and recycling facilities such as lengthy separation time and tank drainage, and lowered cement kiln operational efficiency.
- Project completion deadlines must take into account several important factors: local elections, county budget guidelines, and customs clearance of equipment sent across borders. For example, the adoption of the County Decision was delayed due to pending local elections and a pre-existing, full Council agenda.
- It is difficult to collaborate when multiple project associates are involved in the same project. It helped, however, that the US partner had personnel located in Romania.
- Without a sufficient legal framework in place, more pressure had to be placed on encouraging volunteerism through public outreach. This method for securing participation in the scheme is not as effective as timely sanctions applied for non-compliance of enforced legal requirements.

# Contact Information

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